LLNL Environmental Restoration Division Standard Operating Procedure	TITLE: General Equipment Decontamination
APPROVAL **Date** _____ _____ **Environmental Chemistry and Biology Group Leader**	**PREPARERS:** **G. Howard and E. Walter** **REVIEWERS:** **R. Brown*, T. Carlsen, E. Christofferson*, V. Dibley, J. Duarte, B. Failor*, C. Garcia*, R. Goodrich, J. Greci, B. Hoppes*, S. Mathews*, and B. Ward***
APPROVAL **Date** _____ _____ **Division Leader** **CONCURRENCE** **Date** _____ _____ **QA Implementation Coordinator**	**PROCEDURE NUMBER:** **ERD SOP-4.5** **REVISION: 2** **EFFECTIVE DATE:** **December 1, 1995** **Page 1 of 7**

*Operations and Regulatory Affairs Division

1.0 PURPOSE

To describe methods used for decontamination of field equipment that becomes potentially contaminated during field operations.

2.0 APPLICABILITY

This procedure applies to the decontamination of applicable equipment used for environmental sampling and monitoring activities, prior to, and/or after contact with soils, surface water, or ground water. This procedure is performed to prevent the potential of cross contamination. It also minimizes the possibility of exposure to field personnel from the handling of improperly decontaminated equipment. The equipment may include split spoon samplers, sampling pumps, bailers, trowels, shovels, drill bits, augers, drill rigs, or any other equipment used during field activities.

3.0 REFERENCES

3.1 Site 300 Site Safety Plan (SSP)

3.2 Livermore Mainsite Site Safety Plan (SSP)

3.3 Operational Safety Procedures (OSPs)

3.4 LLNL Health & Safety Manual.

3.5 U.S. Environmental Protection Agency (1987), *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.

3.6 Grandfield, C. H. (1989), *Guidelines for Discharges to the Sanitary-Sewer System*, Lawrence Livermore National Laboratory, Livermore, California (UCAR 10235).

3.7 NIOSH, OSHA, USCG, and EPA (1985), *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), U.S. Coast Guard (USCG), and U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH.

4.0 DEFINITIONS

4.1 Tritium

A radioisotope of hydrogen, hydrogen-3 (^3H). A tritium atom contains one proton and two neutrons. It emits low-energy beta radiation and is relatively short-lived, with a half-life of approximately 12.3 years.

4.2 Volatile Organic Compounds (VOCs)

A group of organic compounds characterized by their tendency to evaporate easily at room temperatures (e.g., gasoline, paint thinners, and nail polish remover).

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

It is the responsibility of all personnel involved with sample collection or decontamination to maintain a clean working environment and to ensure that no contaminants are negligently introduced into the environment. Decontamination is performed in the same level of protective clothing as the sampling activities, unless the Site Health and Safety Plan specifies a different level of protection.

6.0 PROCEDURE

6.1 Livermore Site and Site 300 Office Preparation

6.1.1 Coordinate with the Environmental Chemistry and Biology Group Leader (ECBGL), to determine whether any specialized cleaning equipment is needed.

6.1.2 See SOP 4.9, "Collection of Field QA/QC Samples," for the collection of equipment blanks when specified in the sampling plan.

6.1.3 Determine, in conjunction with the ECBGL that the source water for decontamination purposes is analyte free. Periodic samples may be collected and analyzed upon the ECBGL's request.

6.2 Livermore Site and Site 300 Field Preparation

6.2.1 Obtain materials listed in Equipment Checklist (Attachment A). This list provides general guidance and should be modified to site-specific needs.

6.2.2 Decontaminate all equipment after use, or prior to use if the equipment condition is unknown.

6.3 Site 300 Operation Only

Decontamination is achieved by washing with soap or detergent solutions, tap water, and analyte-free water, or by steam cleaning. Equipment is generally allowed to air dry after being cleaned. If immediate re-use is needed, equipment is thoroughly rinsed with analyte-free water and/or wiped dry with chemical-free cloth or paper towels. Use the steam cleaner as appropriate, especially when decontaminating vehicles, well casing, sampling tubes, and large drilling equipment.

6.3.1 Tritium

Determine if any wells to be sampled contain tritium. Any equipment or materials contaminated with tritium must be decontaminated in the area containing this particular contaminant using the appropriate method described in Sections 6.3.2 through Sections 6.3.4. The rinse and wash water must be contained in a drum and allowed to evaporate similar to the procedures used for purge fluids (SOP 4.7B), "Site 300 Treatment and Disposal of Well Development and Well Purge Fluids."

6.3.2 Decontamination by Rinsing

This is normally performed when contaminant concentrations are negligible or are of a nature where detergents are not necessary. This method is particularly applicable for water soluble compounds or those of a inorganic nature. Contaminants that will not readily adsorb onto the surfaces of equipment and are easily rinsed off the equipment fall into this category.

A. Remove any solid particles from the equipment or material.

B. Triple rinse equipment with analyte-free water.

C. If tritium contamination is present, collect rinsate water and allow to evaporate.

D. If time permits, place equipment on a clean surface and allow to air dry for at least 15 min. If equipment is needed immediately for use, ensure that the equipment has been thoroughly rinsed with analyte-free water and wiped with a chemical-free cloth or paper towel to remove excess water.

6.3.3 Decontamination by Hand Washing with Detergent

Hand washing using a detergent such as Alconox, is performed when contamination is known or suspected to be present, and particularly when organic constituents are involved. This method applies when triple rinsing is not sufficient to remove contaminants, and steam cleaning is not necessary.

A. Acquire appropriate Personal Protective Equipment (PPE) before proceeding (i.e., gloves, safety glasses, coveralls, etc.).

B. Triple rinse with analyte-free water being careful to collect rinsate.

C. Using appropriate brush and detergent, scrub equipment until contaminants have been amply broken down.

D. Triple rinse again with analyte-free water and inspect equipment. Repeat this process as many times as necessary until equipment is visually clean.

E. Allow to air dry for 15 min or wipe dry with a clean cloth or paper towel.

F. Properly dispose of all rinsate water according to SOP 4.7B, "Treatment and Disposal of Well Development and Well-Purge Fluids," after equipment blanks are collected. Wash or appropriately discard any contaminated PPE.

Note: Rinsate containing detergents cannot be discharged to ground or storm drain!

6.3.4 Decontamination by Steam Cleaning

Steam cleaning is performed when equipment is too large to hand wash, or when high-temperature, high-pressure steam is necessary. Steam cleaning can be done at Building 843 provided: 1) it is not a vehicle or drill rig, 2) the equipment has not come in contact with any oils or greases (O&G), and 3) the equipment has not been contaminated with radiological compounds. Drill rigs, vehicles, or equipment contaminated with O&G, must be steam cleaned at the Building 879 Motor Pool.

A. If the equipment has been contaminated with tritium, it must be cleaned per Section 6.3.1.

B. The steam cleaning areas are clearly marked with yellow boundary lines. Keep all equipment and vehicles to be decontaminated within the boundary lines during steam cleaning.

C. To insure the proper use of the steam cleaner, check with the Building 843 or Building 879 Supervisor for any additional instructions that may be applicable (i.e., safety, operation, maintenance, cleanup, etc.)

D. Before proceeding, ensure that tanks or troughs have adequate capacity to contain the rinse water. If steam cleaning at Building 879, ascertain that the drain is not clogged with mud or debris.

E. Steam clean all equipment, and ensure that the equipment remains clean while in transport to, or at, the field site. Plastic sheeting should be used beneath equipment stored on the ground.

6.4 Livermore Site Operation Only

The Livermore Site does not allow evaporation of any rinsate or purge water.

6.4.1 Decontamination Steps

A. Remove any solid particles from the equipment or material.

B. Rinse equipment with analyte-free water.

6.4.2 Decontamination of a Portable Pump

A. Rinse pump and discharge line by spraying analyte-free water on the exterior components where contact is made with contaminated well water.

B. The pump is then inserted into a 55 gal. drum containing analyte-free water and the discharge lines are purged for approximately 5 min.

C. Collect all rinsate and purge water.

D. All rinsate and purge water shall be disposed of according to SOP 4.7A, Livermore Site, "Treatment and Disposal of Well Development and Well-Purge Fluids."

6.5 Site 300 Field Post Operation Only

6.5.1 Sample and analyze the steam-cleaning retention trough water at Building 843 when the troughs are nearly full. Collect samples for metals, volatile organic compounds, oil and grease, and pH analysis.

6.5.2 After results are received, transport water to Building 833 Water Treatment Facility for air stripping and misting.

6.6 Livermore Site and Site 300 Field Post Operation

Properly dispose of expendable items that cannot be decontaminated.

6.7 Livermore Site and Site 300 Office Post Operation

Check and restock decontamination supplies to maintain adequate amounts of all decontamination rinsing liquids and materials.

7.0 QA RECORDS

7.1 Steam Cleaner Logbook

7.2 Livermore Site Presample Purge and Decontamination Rinsate Logbook

8.0 ATTACHMENTS

Attachment A—Equipment Checklist

Attachment A

Equipment Checklist

EQUIPMENT CHECKLIST

____ Cleaning liquids such as soap and/or detergent solutions, tap water, analyte-free water

____ Chemical-free cloth or paper towels

____ Cleaning brushes

____ Cleaning containers such as plastic buckets or galvanized steel pans

____ Waste-storage containers such as drums and plastic bags

____ Steam cleaner

____ SOPs